

A New Locality of *Antiaris toxicaria* subsp. *macrophylla* (*Moraceae*) in the Andaman Islands, India, with a Note on Its Conservation

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The present paper reports an extended distribution of *Antiaris toxicaria* (Pers.) Lesch. subsp. *macrophylla* (R. Br.) C. C. Berg (*Moraceae*) to the Andaman Islands, India. Detailed description, geographical distribution, notes on ecology, photograph of herbarium sheet, and line drawings of this taxon are provided to facilitate easy identification in the field and herbarium.

Key words: Andaman Islands, *Antiaris toxicaria* subsp. *macrophylla*, conservation, India, *Moraceae*, new locality.

The genus *Antiaris* Lesch. (*Moraceae*) is widely distributed in continental tropical Africa, Yemen, Madagascar, and from Sri Lanka to Tonga covering countries from Malesia to the South-West Pacific Polynesia, Melanesia, Oceania and China (Kochummen 1978, Chew 1989, Wu et al. 2003, Berg et al. 2006). Corner (1962) revised this genus and he reduced seventeen species formerly described to four species, *A. africana* Engl., *A. toxicaria* Lesch., *A. humbertii* Leandri and *A. madagascariensis* H. Perrier. He merged all the Asian and Australian species at varietal level under *A. toxicaria*, and kept African and Madagascan species separate. Later, Berg (1977) revised African *Moraceae*, and he recognized only one species in the genus, *A. toxicaria*. He reduced Corner's three species to a subspecific rank, subspp. *africana*, *humbertii*, and *madagascariensis*, and at the

same time he upgraded Corner's two varieties of *A. toxicaria* to the subspecific rank, subspp. *macrophylla* (R. Br.) C. C. Berg and *welwitschii* (Engl.) C. C. Berg. In India, subsp. *toxicaria* has so far been reported from Andaman Islands, Andhra Pradesh, Maharashtra, Karnataka, Kerala and Tamil Nadu (Ravikumar and Sankar 2009).

During the course of a revision of *Moraceae* in India, one of us (G.K.U.) came across several herbarium specimens in CAL, collected from Andaman Islands labeled as *Antiaris toxicaria* (Pers.) Lesch. collected by King's collectors and by Parkinson. Detailed critical study of the morphology of these specimens and scrutiny of the literature (Hooker 1888, Parkinson 1923, Lakshminarasimhan and Rao 1996, Samadar and Roy 1997, Dagar and Singh 1999, Berg et al. 2006, Pandey and Diwakar 2008) revealed



that they belonged to *A. toxicaria* subsp. *macrophylla*. This paper reports the new locality of *A. toxicaria* subsp. *macrophylla*, with detailed description, distribution, ecological observations, and illustrations of Indian *A. toxicaria* to facilitate easy identification in the field as well as herbarium specimens.

Antiaris toxicaria (Pers.) Lesch. in Ann. Mus. Natl. Hist. Nat. **16**: 478, t. 22 (1810); Trecul in Ann. Sci. Nat., Bot. ser. 3, **8**: 143, t. 6, f. 158 – 168 (1847); Kurz, Forest Fl. Burma **2**: 462 (1877); J. D. Hooker, Fl. Brit. Ind. **5**: 537 (1888); Woodrow in J. Bombay Nat. Hist. Soc. **12**: 516 (1899); T. Cooke, Fl. Bombay **2**: 656 (3: 156) (1907); Talbot, Forest Fl. Bombay **2**: 530, f. 534 (1911); C. E. Parkinson, Forest Fl. Andaman Isl. 254 (1923); C. E. C. Fischer in Gamble, Fl. Madras **3**: 1367 (1928); Corner in Gard. Bull. Singapore **19**: 248 (1962); G. Watt, Dict. Econ. Prod. India **1**: 266 (1972); C. C. Berg in Bull. Jard. Bot. Natl. Belg. **47**: 310 (1977) & **48**: 466 (1978); Kochummen, Tree Flora of Malaya **3**: 120 (1978); Corner in Dassanayake & Fosberg, Revis. Handb. Fl. Ceylon **3**: 288, f. 31 (1981); C. J. Saldanha, Fl. Karnataka **1**: 109 (1984); S. M. Almeida, Fl. Savantwadi **1**: 403 (1990); M. Mohanan and A. N. Henry, Fl. Thiruvananthapuram 430 (1994); V. V. Sivarajan & P. Mathew, Fl. Nilambur 658 (1997); K. M. Matthew, Fl. Palni Hill **2**: 1169, t. 665 (1999); S. Punekar & P. Lakshminarasimhan in Indian J. Forest. **26**(3): 269 (2003); N. Sasidharan, Biodiv. Doc. Kerala **6**: Fl. Pl. 437 (2004); C. C. Berg, E. J. H. Corner & F. M. Jarrett, Fl. Males. ser 1, **17**(1): 141 (2006); K. Ravikumar & R. Vijaya Sankar in J. Threat. Taxa **1**(1): 58 (2009).

Type: INDONESIA. Java, Leschenault s.n. (holo-P!).

Deciduous monoecious trees with a straight stem, trunk 2–4 m in girth, buttressed; wood white, soft; latex milky or pale yellow, turning brown, poisonous. Leaves simple, alternate, distichous, unequally cordate to widely cuneate or rounded at base, acuminate or subacute

at apex, scabrid both sides, shining above; reticulation prominent below, midrib raised below, hispid with brownish hairs; lateral veins 7–18 pairs on each side of midrib, hispid with brown hairs, parallel, apically inflexed; stipules lateral, ovate-lanceolate, acute, puberulous or hirtellous above, more so along the midrib and tip, inside glabrous, caducous, left behind scar; petioles short, channeled, 0.3–1.5 cm long, densely hairy in young, sparsely hirsute or strigose or glabrous in old. Inflorescences axillary on new twigs with young leaves. Male inflorescences many-flowered, on an axillary discoid or flat fleshy receptacle, disc reflexed pulvinate, 1–5 cm wide, edge rounded, usually 3–4 clustered together in the axils of leaves, orbicular, tomentose; peduncles long, 0.8–1.5 cm long, hairy or velvety, pale brown when dry, subtended by confluent imbricate involucral bracts; involucral bracts many in ca. 4 rows, short, 1–2 mm long, triangular, boatlike, outside pubescent. Male flowers sessile or shortly pedicellate, up to 1.0 mm long; tepals 4, obovate, spatulate, cucullate, hairy on outside; stamens 3–8, included in bud, filament very short, ca. 1 mm; anthers ellipsoid, erect, yellow with purple spots. Female inflorescence solitary, pedunculate, usually below male inflorescence on the scar of leaves, enclosed in a pear shaped axillary subsessile velvety involucre of numerous confluent bracts crowded at the apex, persistent. Female flowers stalked, 1–5 mm long, 4 mm wide; tepals 4; style 2-branched, subuliform, pubescent; stigmas 2; ovary adnate to the involucre, ovule 1, pendulous. Fruits drupes, ellipsoid to pyriform, subpedunculate, fleshy, ripening red to crimson in mature, purple and finally black, velutinous. Seeds with hard exotesta. 1–1.6 cm long, edible.

Key to the subspecies of *Antiaris toxicaria* in India

- 1a. Leaves elliptic-lanceolate or obovate; margin serrulate in mature leaves; fruits small (up to 2.5 cm long, 2 cm wide) subsp. *toxicaria*

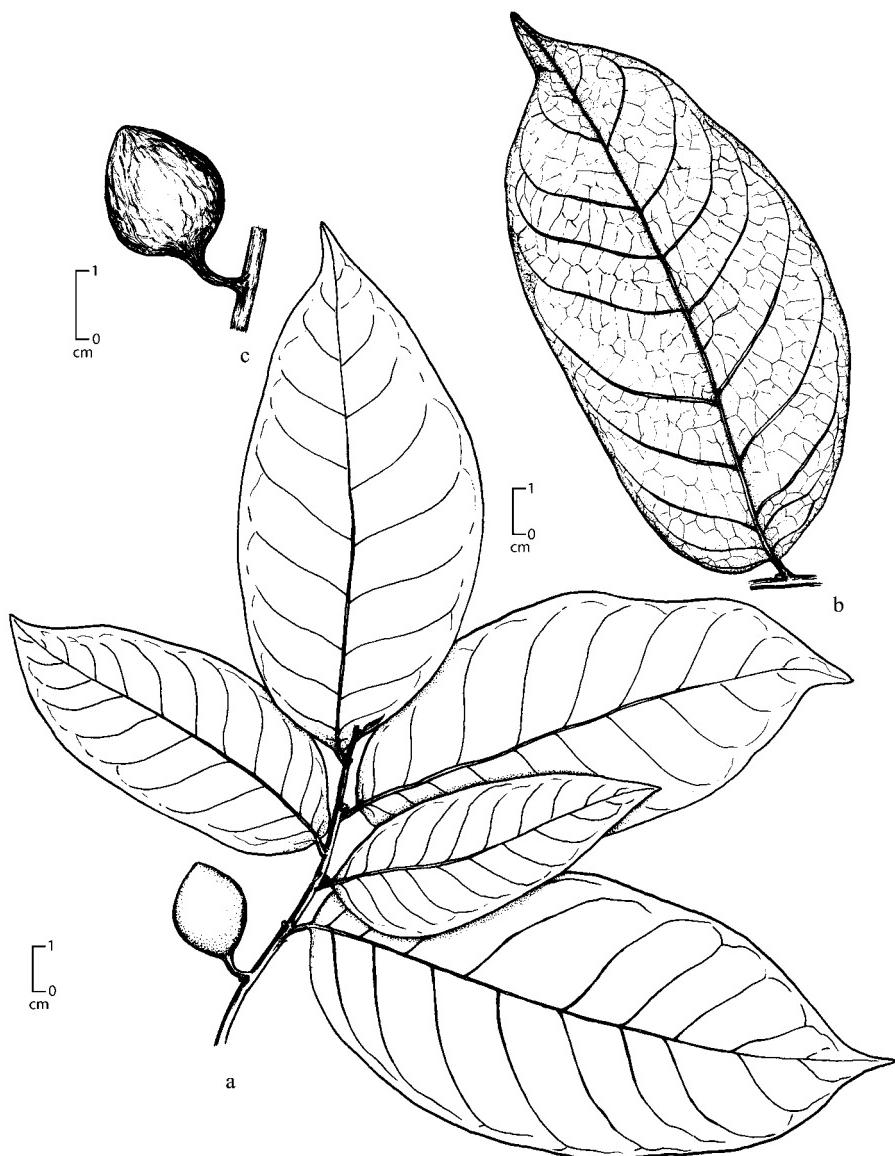


Fig. 2 *Antiaris toxicaria* subsp. *macrophylla* from Andaman Islands. a. Flowering twig. b. Mature leaf. c. Fruit. Drawn from King's collector s.n. (CAL 430737).

1b. Leaves elliptic-ovate or subovate; margin entire in mature leaves; fruits large (up to 4 cm long, 2.5 cm wide) subsp. *macrophylla*

Subsp. **toxicaria**

Ipo toxicaria Pers., Syn. Pl. 2(2): 566 (1807).

Antiaris innoxia Blume in Rumphia 1: 172, t. 54 (1837); Miquel, Fl. Ned. Ind. 1(2): 292

(1859); Thwaites, Enum. Pl. Zeyl. 263 (1861); R. H. Beddome, Fl. Sylv. S. India 2: t. 307 (1873); Brandis, For. Fl. N. W. India 427 (1873).

Lepurandra saccidora Nimmo in J. Graham, Cat. Pl. Bombay 193 (1839).

Antiaris saccidora (Nimmo) Dalzell in Hooker's J. Bot. Kew Gard. Misc. 3: 232 (1851); Wight, Icon. Pl. Ind. Orient. 6: 7, t. 1958 (1853);

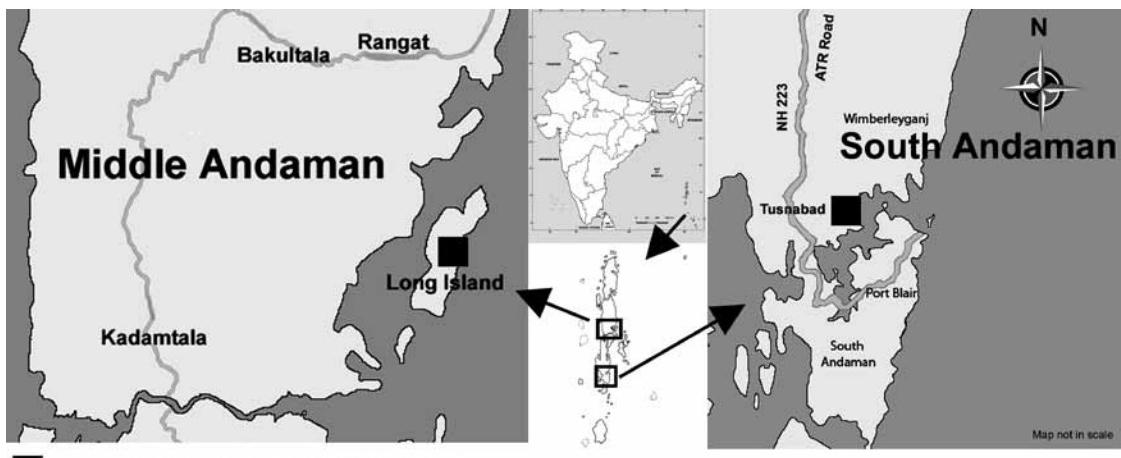


Fig. 3. Distribution of *Antiaris toxicaria* subsp. *macrophylla* in the Andaman Islands, India.

Dalzell & A. Gibson, *Bombay Fl.* 244 (1861).

Antiaris zeylanica Seem. in *Bonplandia* 10: 4 (1862).

Tree up to 50 m tall, periderm usually persistent. Leaves elliptic to lanceolate or obovate, oblanceolate in young, serrulate, hirsute, 4–15 cm long, 2–8 cm wide, subcoriaceous; long acuminate at apex, acumen ca 2 cm long, curved, margin serrate or denticulate in young but entire in old or sometimes dentate at apex; abaxially pale green but brown when dry and hirtellous to hispidulous more so along main and secondary veins, glabrous when old, scabrous, adaxially dark green and sparsely hirtellous or puberulous, glabrous in old, pale brown when dry, smooth; stipules 0.4–1.1 cm long. Fruits 1–2.5 cm long, 1–2 cm wide.

Flowering and Fruiting: September to May.

Distribution: INDIA: Andaman & Nicobar Islands, Andhra Pradesh, Karnataka, Kerala, Maharashtra and Tamil Nadu. Borneo, Celebes, CHINA, INDONESIA, Lesser Sunda Islands, MALAYSIA, MANMAR, PHILIPPINES, SRI LANKA, THAILAND and VIETMAM.

Ecology: Commonly growing in evergreen forests along ghats and in rain forests up to 1500 m from the sea level. Also seen in the riparian patches of evergreen forest in association with

Ancistrocladus heyneanus Wall. ex J. Graham, *Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guillem. & Perr., *Beilschmiedia bourdillonii* Brandis, *Canarium strictum* Roxb., *Celtis timorensis* Span., *Dimorphocalyx lawianus* Hook. f., *Gnetum ula* Brongn., *Ficus nervosa* Roth, *Mallotus philippensis* (Lam.) Muell. Arg., *Mammea suriga* (Buch.-Ham. ex Roxb.) Kosterm., *Mangifera indica* L., *Morinda umbellata* L., *Murraya paniculata* (L.) Jack, *Olea dioica* Roxb., *Pisonia aculeata* L., *Schleichera oleosa* (Lour.) Oken, *Sterculia urens* Roxb., *Streblus taxoides* Kurz, *Strombosia ceylanica* Gardn., *Trema orientalis* (L.) Blume. Occasionally found in semi evergreen forest of Kerala, west coast and littoral forest of Andaman Islands.

Uses: In Kerala, the timber is used as soft-wood. The inner bark is fibrous. The local tribe peel off the bark, beat it with wooden stumps to soften it, and use it for making clothings, bags and also as sleeping mats. Often patients with serious burn injuries are treated with the fresh bark of this tree. The latex seems to have some analgesic effect. However, in Malaya the latex is considered highly poisonous (Fischer 1928). It was observed that the author (G.K.U.) felt the same analgesic effect while collecting this

Table 1. Comparative morphology of *Antiaris toxicaria* subsp. *toxicaria* and subsp. *macrophylla*

	<i>Antiaris toxicaria</i> subsp. <i>toxicaria</i>	<i>Antiaris toxicaria</i> subsp. <i>macrophylla</i>
Hairyness in twigs	appressedly to patently puberulous to hirtellous	sparsely appressedly puberulous
Periderm	usually persistent	usually flaking off
Leaf shape	elliptic-lanceolate or obovate, apex long acuminate, acumen curved, margin serrate or serrulate	elliptic to obovate or subobovate, broader at middle, apex acuminate to subacute to obtuse, acumen straight, margin entire
Leaf surface	upper surface hirtellous to hispidulous to puberulous, scabrous to smooth; lower surface appressedly to patently puberulous to hirtellous	upper surface sparsely puberulous, more so along midribs otherwise glabrous, smooth; lower surface sparsely puberulous
Fruit length	1–2.5 cm long	2–4 cm long

species in the field at South India.

Specimens examined: **INDIA. ANDAMAN & NICOBAR ISLANDS:** Narcodam, March 1891, D. Prain s.n. (CAL 430743); Little Andaman, 4 km North from Hut Bay, alt. 0 m (♂), 16 May 2008, G. K. Upadhyay 42252 (CAL). **ANDHRA PRADESH:** Chittoor district, Talakona, alt. 650 m (♂), 29 Jan. 2007, K. Ravikumar & R. V. Sankar 105855 (FRLH, Image !). **KARNATAKA:** North Kanara, Siddapur taluk, Malemane, 6 May 1939, N. L. Bor 11272 (DD 81558); Coorg, Kutnupole Range (♀ & ♂), Dec. 1921, D. F. O. Coorg 3178 (DD 24076, 24077). **KERALA:** Kozikode Dist., Malabar Botanical Garden, Calicut 13 Nov. 2007, G. K. Upadhyay 42225 (CAL); Patthinamthitta Dist., Ayyappan Temple, way to Sabrimalai (♀), 25 Apr. 1984, R. F. E. Vajravelu 80589 (CAL). **MAHARASHTRA:** Kolhapur Dist., Near Tilari Dam, Morle, 600 m (♀), 24 Nov. 2007, G. K. Upadhyay 42234 (CAL); Khandala, St. Xavier Ravine by Echo Pt. (♂), 26 Oct. 1950, H. Santapau 11725 (BLAT). **TAMIL NADU:** Tirunelvelly District, Courtallam, 17 Aug. 1933, without collector's name s.n. (CAL 565222); Madurai District, Kodaikanal, Vengayapparai, alt. 725 m (♀), 12 Sep. 1986, K. M. M. 46874 (RHT 68296).

Notes: This tree is veritable giant of the forests and the tallest tree from peninsular India (Beddome 1873). Fischer (1928) concurs with Beddome's statement 'The largest tree of South India, attaining an height of 250 feet.' This species is culturally important from a historical perspective as the bark was used as cloth commonly known as tappa cloth in ancient times. Previously it is reported from Western Ghats of Maharashtra, Karnataka, Kerala, Tamilnadu and the Andaman Islands, but recently Ravikumar & Sankar (2009) reported it

for the first time from mixed deciduous forests of Eastern Ghats of Andhra Pradesh.

Subsp. **macrophylla** (R. Br.) C. C. Berg in Bull. Jard. Bot. Natl. Belg. **47**(3–4): 309 (1977); C. C. Berg, E. J. H. Corner & F. M. Jarrett, Fl. Males. **17**(1): 143 (2006); Chew in Fl. Australia **3**: 24, f. 29D & E (1989). [Figs. 1, 2]

Type: AUSTRALIA. Northern Territory, Company Is., Arnhem Land, Feb. 1803, R. Brown s.n. (holo-BM !).

Antiaris macrophylla R. Br. in Flinders, Voy. Terra Austral. **2**: 602, t. 5 (1814); Bentham, Fl. Austral. **6**: 179 (1873).

Antiaris toxicaria var. *macrophylla* (R. Br.) Corner in Gard. Bull. Singapore **19**: 248 (1962).

Tree up to 40 m tall, periderm usually peeling off in small flakes. Leaves elliptic to ovate or subovate, broadest at middle, 3–22 cm long, 2.5–13 cm wide, coriaceous, acumen 0.5–1 cm long, entire; abaxially glossy dark green, sparsely appressed puberulous, smooth, adaxially sparsely puberulous to strigose; stipules 0.3–0.5 cm long. Fruits 2–4 cm long, 1.5–2.5 cm wide.

Flowering & Fruiting: Flowering starts from September and fruits appear during the end of February, which extends up to May.

Habitat: Rarely found in littoral and inland tropical forest up to 100 m from the sea level.

Uses: Fruits are edible. The latex is known to be highly poisonous if injected into the blood

stream and as such is widely used in South East Asia by hunting communities. The level of toxicity is much less and will apparently have no harmful effect if swallowed.

Distribution: INDIA: Andaman Islands (Fig. 3). AUSTRALASIA: North Australia (Company's Isl. off Arnhem land), Cape York Peninsula, Queensland. MALESIA: East Timor, Moluccas, Wetar and Tanibar Islands. MELANESIA: Fiji, New Guinea including Bismarck Archipelago, New Hebrides, Solomon Islands, Vanuatu. POLYNESIA: Tonga. PHILIPPINE ISLANDS (see Corner 1962, Berg 1977, Kochummen 1978, Chew 1989, Wu et al. 2003, Berg et al. 2006).

Specimens examined: INDIA. ANDAMAN & NICOBAR ISLANDS. South Andaman, Tushnabad, Hill Jungle (♀), 11 June 1892, King's collector s.n. (CAL 430737); Tushnabad, Hill Jungle (♀), 11 June 1892, King's collector s.n. (DD); Long Islands, alt. ca. 0 m, 15 Dec. 1915, C. E. Parkinson 779 (CAL 430739).

Fiji, Viti or Fiji Islands (♀), 1860, Seemann 44 (B, image !); unspecified locality from Asia (♂), Bennett s.n. (B, image !); Papua New Guinea (♀), 27 Mar. 1936, C. E. Carr 16261 (B, image !).

Antiaris toxicaria subsp. *macrophylla* is distinguished from its allies by its larger fruits and broad elliptic-ovate or subovate leaves (Table 1). In Java, flowering starts in June on the new shoots while in Andaman it produces seeds in April to May. It is a magnificent deciduous tree of the forest canopy, but its population in the field is very sporadic in Andaman Islands, since no collections have been made after 1915. This indicates that this subspecies is very localized in distribution and it occurs in few localities. Some more extensive survey is needed to locate this species in other areas of the adjoining islands. Its soft fruits might be dispersed by birds, bats and monkeys basically langurs. Seeds germinate within 3 months if they get proper nutrients. In spite of very good regeneration potential of the typical subspecies in these islands as observed by the author, it is a matter of concern that the seeds of subsp. *macrophylla* may lose viability very fast and have a very low regeneration rate.

This may be one of the reasons for decrease in its population causing the failure of recollection and we fear that it may be an endangered taxon from these Islands in due course of time. Hence, efforts should be made to relocate and to collect this rare, economically important taxon and should be conserved through *in situ* and *ex situ* methods.

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G. K. ウパディアイ^{a,*}, S. K. スリヴァスタヴァ^a, A. A. アンサリ^b: *Antiaris toxicaria* subsp. *macrophylla* (クワ科) のアンダマン諸島における新産地とその保全

クワ科の高木, *Antiaris toxicaria* (Pers.) Lesch. subsp. *macrophylla* (R. Br.) C. C. Berg がインド・アンダマン諸島で新たに見出された。本稿ではそれに基づいた本植物

の詳しい記載、分布域、生態的なノートなどを示した。

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